Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Right-angled trigonometry

Time allowed: 45 minutes

Subject code **0580**

Mathematics

Questions from Paper 1, Paper 2, Paper 3 and Paper 4

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.
You may use a calculator.

Total marks

/ 38

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.
- Unless a question says otherwise, give answers that are not exact to 3 significant figures, and angles in degrees to 1 decimal place.

Information

- This paper has 10 questions worth 38 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

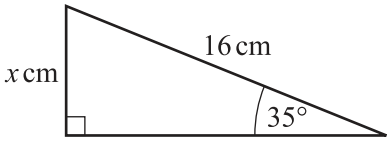
Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1



NOT TO SCALE

The diagram shows a right-angled triangle.

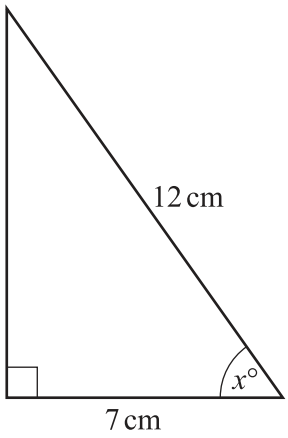
Calculate the value of x.

$x =$ ..... [2]

SOHCAHTOA Click for more variations

1	9.18 or 9.177…	**2**	**M1** for $\sin 35 = \frac{x}{16}$ or better

2



NOT TO SCALE

Calculate the value of x.

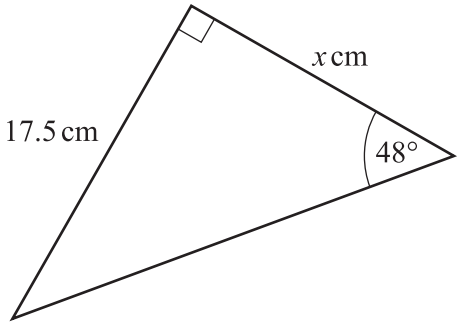
$x =$ ..... [2]

SOHCAHTOA Click for more variations

2	54.3 or 54.31…	**2**	**M1** for $\cos [x] = \frac{7}{12}$ oe

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3



NOT TO SCALE

The diagram shows a right-angled triangle.

Show that the value of x is 15.8, correct to 3 significant figures.

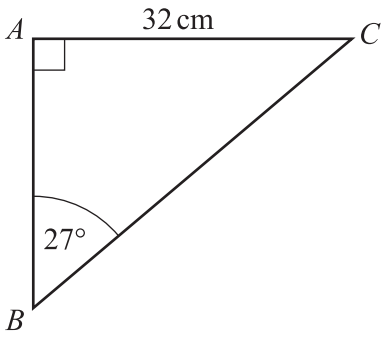
[3]

SOHCAHTOA Click for more variations

3	$[x =] \dfrac{17.5}{\tan 48}$ or $[x =] \tan 42 \times 17.5$	**M2**	**M1** for $\tan 48 = \dfrac{17.5}{x}$ or $\tan (90 - 48) = \dfrac{x}{17.5}$
	15.75.. or 15.76	**A1**	

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4



NOT TO SCALE

ABC is a right-angled triangle.

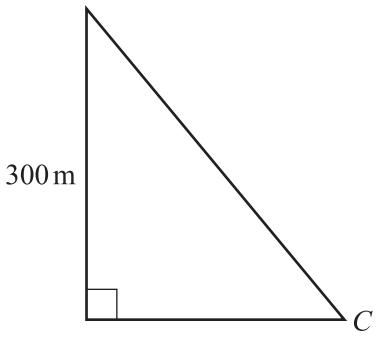
Calculate *BC*.

BC = ... cm [3]

SOHCAHTOA Click for more variations

4	70.5 or 70.48 to 70.49	**3**	**M2** for $[BC =]\frac{32}{\sin 27}$ or $\frac{32}{\cos 63}$ oe or **M1** for $\sin 27 = \frac{32}{BC}$ or $\cos 63 = \frac{32}{BC}$ oe

5 From the top of a building, 300 metres high, the angle of depression of a car, *C*, is 52°.



NOT TO SCALE

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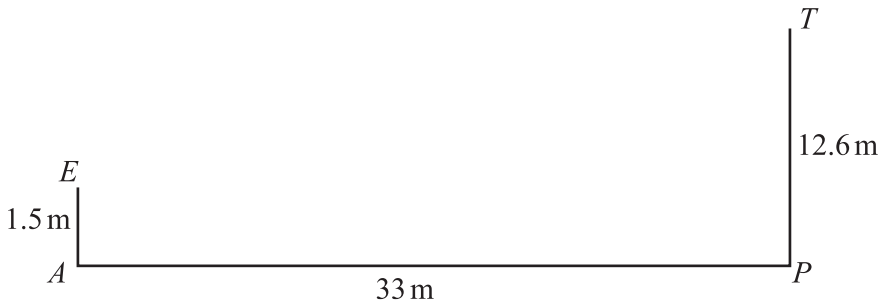
Calculate the horizontal distance from the car to the base of the building.

..... m [3]

SOHCAHTOA Click for more variations

5	234 or 234.3 to 234.4	**3**	**M2** for [dist =] $\frac{300}{\tan 52}$ oe or **M1** for correct implicit trig statement allow **M1** if they use *their* 52 or *their* 38 provided it is marked on the diagram or **B1** for 52 or 38 correctly placed If zero scored, **SC1** for final answer 384

6



NOT TO SCALE

The diagram shows two vertical poles, *AE* and *PT*, standing on horizontal ground, *AP*.

Calculate the angle of elevation of the point *T* from the point *E*.

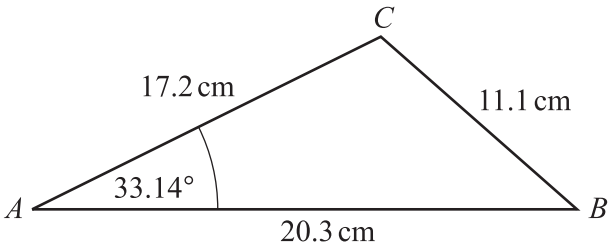
..... [3]

Angles of elevation and depression Click for more variations

6	18.6 or 18.59…	**3**	**M2** for tan = $\frac{12.6-1.5}{33}$ oe or **M1** identifying the correct angle of elevation or for 18.6 or 18.59… seen and spoiled After 0 scored **SC1** for [angle *ETP* =] 71.4 or 71.4[0…] or 71.41

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7



NOT TO SCALE

Calculate the shortest distance from C to AB.

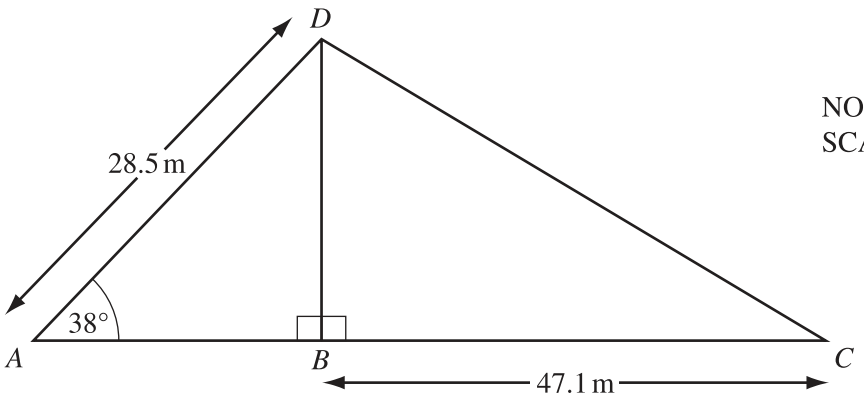
..... cm [3]

SOHCAHTOA Click for more variations

7	9.4[0] or 9.403...	**3**	**M2** for $\sin 33.14 = \frac{\text{dist}}{17.2}$ oe or **M1** for recognition that the line from C is perpendicular to AB

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8



NOT TO SCALE

A flagpole, *BD*, is attached to level horizontal ground by ropes, *AD* and *CD*.

AD = 28.5 m, *BC* = 47.1 m and angle *DAB* = 38°.

Calculate

(a) *BD*, the height of the flagpole,

Answer(a) BD = ... m [2]

(b) angle *BCD*.

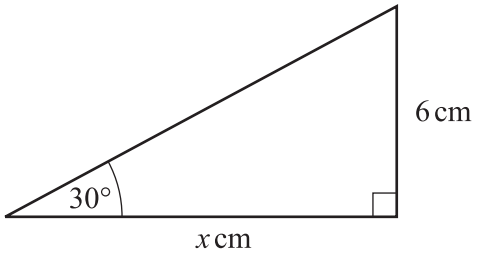
Answer(b) Angle *BCD =* ..... [2]

(a) SOHCAHTOA (b) SOHCAHTOA Click for more variations

8	**(a)** 17.5(……)	**2**	**M1** for $\sin 38 = \frac{x}{28.5}$ or better
	(b) 20.38 to 20.44	**2ft**	**M1** for tan (*BCD* =) their **(a)** ÷ 47.1

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9



NOT TO SCALE

Find the exact value of x.

$x =$ ..... [4]

Exact trigonometric values Click for more variations

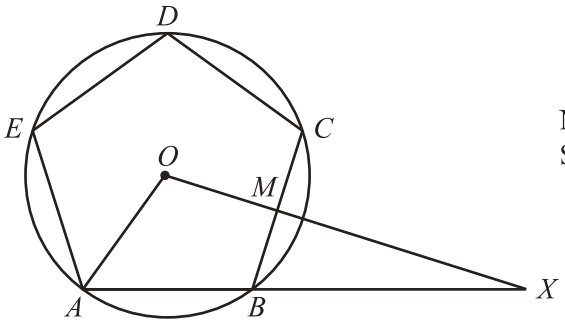
9	$6\sqrt{3}$ oe	**4**	**B1** for $\tan 30 = \frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$ or for $\sin 60 = \frac{\sqrt{3}}{2}$ **and** $\sin 30 = \frac{1}{2}$ **M2** for $\frac{6}{\tan 30}$ or $\frac{6\sin(60)}{\sin(30)}$ or **M1** for $\frac{6}{x} = \tan 30$ or $\frac{\sin 60}{x} = \frac{\sin 30}{6}$

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10 **(a)** Show that each interior angle of a regular pentagon is 108°.

[2]

(b)



NOT TO SCALE

The diagram shows a regular pentagon $ABCDE$.
The vertices of the pentagon lie on a circle, centre O, radius 12 cm.
M is the midpoint of BC.

(i) Find BM.

$BM =$ ..... cm [3]

(ii) OMX and ABX are straight lines.

(a) Find BX.

$BX =$ ..... cm [3]

(b) Calculate the area of triangle AOX.

..... cm^2 [3]

(a) Angles in polygons (b)(i) SOHCAHTOA (b)(ii)(a) SOHCAHTOA (b)(ii)(b) Area of a triangle

Click for more variations

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10(a)	$180-\frac{360}{5}$ or $\frac{(5-2)\times 180}{5}$ or $\frac{(2\times 5-4)\times 90}{5}$ or $\frac{5\times 180-360}{5}$	**M2**	or **M1** for $\frac{360}{5}$ or $(5-2)\times 180$ or $90(2\times 5-4)$ or $3\times 180\div 5$ or $6\times 90\div 5$ or $5\times 180-360$ If 0 scored, **SC1** for $\frac{5-2\times 180}{5}$
10(b)(i)	7.05 or 7.053…	**3**	**M2** for $12\times\cos 54$ oe or **M1** for implicit form or **B1** for length of edge of pentagon = 14.1 to 14.11 If 0 scored, **SC1** for right angle at *M*
10(b)(ii)(a)	22.8 or 22.81 to 22.83… nfww	**3**	**M2** for $\frac{\textit{their}\ \textbf{(b)(i)}}{\cos 72}$ oe or **M1** for implicit form oe or **B1** for *AX* = 36.9 or 36.93 to 36.94
10(b)(ii)(b)	179 or 179.1 to 179.3…	**3**	**M2** for $\frac{1}{2}\times 12\times \textit{their}\ AX\times\sin 54$ oe or $\frac{1}{2}\times 12\times \textit{their}\ OX\times\sin 108$ oe or $\frac{1}{2}\times \textit{their}\ AX\times \textit{their}\ OX\times\sin 18$ or $\frac{1}{2}\times 12^2\times\sin 72+\text{area}\ OBX$ oe or $\frac{1}{2}\times 12^2\times\sin 72+\text{area}\ OMB+\text{area}\ MBX$ oe or **M1** for a correct method to find area of one relevant triangle *AOB*, *OMB*, *MBX*, *OBX* or *ONX* **seen**

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